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TOXICS RELEASE INVENTORY
Guidance for Reporting Toxic Chemicals within the Polycyclic Aromatic Compounds Category

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires certain facilities manufacturing, processing, or otherwise using listed toxic chemicals to report their environmental releases of such chemicals annually. Beginning with the 1991 reporting year, such facilities also must report pollution prevention and recycling data for such chemicals, pursuant to section 6607 of the Pollution Prevention Act, 42 U.S.C. 13106. When enacted, EPCRA section 313 established an initial list of toxic chemicals that was comprised of more than 300 chemicals and 20 chemical categories. EPCRA section 313(d) authorizes EPA to add chemicals to or delete chemicals from the list, and sets forth criteria for these actions.

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Section 1. Introduction

On November 30, 1994 EPA added 286 chemicals and chemical categories, which include 39 chemicals as part of two delineated categories, to the list of toxic chemicals subject to reporting under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), 42 U.S.C. 11001. These additions are described at 59 FR 61432, and are effective January 1, 1995 for reports due July 1, 1996. Six chemical categories (nicotine and salts, strychnine and salts, polycyclic aromatic compounds, water dissociable nitrate compounds, diisocyanates, and polychlorinated alkanes) are included in these additions. At the time of the addition, EPA indicated that the Agency would develop, as appropriate, interpretations and guidance that the Agency determines are necessary to facilitate accurate reporting for these categories. This document constitutes such guidance for the polycyclic aromatic compounds category.

Section 1.1 Who Must Report

A plant, factory, or other facility is subject to the provisions of EPCRA section 313, if it meets all three of the following criteria:

- It is included in a covered Standard Industrial Classification (SIC) code as listed in the following table; and

Industrial Sector	SIC code
Manufacturing	20-39
Metal mining	10 (except 1011, 1081, and 1094)
Coal mining	12 (except 12411)
Electrical utilities	4911, 4931, and 4939, limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce
Treatment, storage, and disposal facilities	4953, limited to RCRA Subtitle C permitted or interim status facilities
Solvent recovery services	7389, limited to facilities primarily engaged in solvent recovery services on a contract or fee basis
Chemical distributors	5169
Petroleum bulk terminals	5171

- It has 10 or more full-time employees (or the equivalent 20,000 hours per year); and

- It manufacturers, imports, processes, or otherwise uses any of the toxic

chemicals listed on the EPCRA section 313 list in amounts greater than the "threshold" quantities specified below.

Section 1.2 Thresholds

Thresholds are specified amounts of toxic chemicals used during the calendar year that trigger reporting requirements.

If a facility *manufactures* or *imports* any of the listed toxic chemicals, the threshold quantity will be:

- 25,000 pounds per toxic chemical or category over the calendar year.

If a facility *processes* any of the listed toxic chemicals, the threshold quantity will be:

- 25,000 pounds per toxic chemical or category over the calendar year.

If a facility *otherwise uses* any of the listed toxic chemicals (without incorporating it into any product or producing it at the facility), the threshold quantity is:

- 10,000 pounds per toxic chemical or category over the calendar year.

EPCRA section 313 requires threshold determinations for chemical categories to be based on the total of all chemicals in the category manufactured, processed, or otherwise used. For example, a facility that manufactures three members of a chemical category would count the total amount of all three chemicals manufactured towards the manufacturing threshold for that category. When filing reports for chemical categories, the releases are determined in the same manner as the thresholds. One report is filed for the category and all releases are reported on this form.

Section 1.3 Chemicals Within the Polycyclic Aromatic Compounds Category

EPA is providing lists of CAS numbers and chemical names to aid the regulated community in determining whether they need to report for the polycyclic aromatic compounds category. The first list includes all individual chemicals within the polycyclic aromatic compounds category. If a facility is manufacturing, processing, or otherwise using a chemical which is on this list, they must report this chemical. The second list includes chemical mixtures which might contain polycyclic aromatic compounds within the category. If a facility is manufacturing, processing, or otherwise using a mixture which is on this list and contains a polycyclic aromatic compound from the first list, they must report the polycyclic aromatic component. However, this list is not exhaustive. If a facility is manufacturing, processing, or otherwise using a mixture that contains a polycyclic aromatic compound from the first list, they must report the polycyclic aromatic

component, even if the mixture does not appear on the second list.

Section 1.4 *De Minimis* Concentrations

The polycyclic aromatic compounds category is subject to the 0.1 percent *de minimis* concentration with the exception of dibenzo[a,e]fluoranthene which is subject to the one percent *de minimis* concentration. Thus, mixtures that contain members of this category equal to or in excess of the *de minimis* should be factored into threshold and release determinations.

Section 2. Guidance for Reporting Chemicals within the Polycyclic Aromatic Compounds Category

Polycyclic aromatic compounds (PACs) are part of the broader class of chemicals identified as polycyclic organic matter (POM). POM generally refers to matter identified in the urban atmosphere, usually as suspended particles, produced from the incomplete combustion of fuels. Polycyclic aromatic compounds, also referred to as polycyclic (and polynuclear) aromatic hydrocarbons (PAHs), can be divided into two sub-classes: biaryls and condensed benzenoids. Biaryl compounds are characterized structurally by two or more aromatic rings connected by a single bond. Condensed benzenoid compounds, the larger of the two sub-classes, are characterized structurally by at least two, usually three or more aromatic rings fused together such that each pair of fused rings shares two carbons. Biphenyl, the simplest example of a biaryl compound, is included on the initial EPCRA section 313 list. Naphthalene and anthracene, two of the simplest examples of condensed benzenoid compounds, are also included on the initial EPCRA section 313. The nineteen individual chemicals of the delineated polycyclic aromatic compounds category added to the EPCRA section 313 list on November 30, 1994 are also examples of condensed benzenoid compounds.

Section 2.1 Structural Features of Chemicals within the PACs Category

Section 3 lists the nineteen individual chemicals of the polycyclic aromatic compounds category added to the EPCRA section 313 list. Of the nineteen chemicals, ten are relatively simple compounds structurally in that they are composed only of fused benzene rings (all contain four or five rings). These ten compounds include benz[a]anthracene and a dimethyl derivative, dibenz[a,h]anthracene, chrysene and a methyl derivative, benzo[a]pyrene, and four dibenzopyrene isomers. PACs can also contain five-membered nonaromatic hydrocarbon rings fused to six-membered aromatic hydrocarbon rings. Of the nineteen chemicals of the PACs category, five are composed of one five-membered nonaromatic hydrocarbon ring fused to aromatic hydrocarbon rings (the total number of benzene rings is four or five). These five compounds include three benzofluoranthene isomers, dibenzo[a,e]fluoranthene, and an indenopyrene isomer.

PACs can contain atoms other than carbon and hydrogen that either are attached to a ring or are part of a ring. Aza-arenes are the neutral nitrogen analogs of PACs that contain only carbon and hydrogen. PACs containing fused 5-membered nitrogen-containing rings such as carbazole are aromatic. PACs can also contain fused 6-membered nitrogen heterocycles such as acridine. Of the nineteen chemicals of the PACs category, three contain fused nitrogen heterocycles. These three compounds include two dibenzacridine isomers and one dibenzocarbazole isomer. Nitroarenes are PACs which contain one to two attached nitro groups. One nitroarene, 1-nitropyrene, is included in the PACs category.

Section 2.2 Formation of PACs

The pyrolysis of hydrocarbon compounds results in the formation of various carbon-based radical species which quickly combine to form a variety of compounds including polycyclic aromatic compounds. In general, PACs can be formed from any pyrolysis or combustion process that involves the burning of organic compounds (those containing carbon and hydrogen).

Factors, Affecting the Quantity of PACs Generated from Pyrolysis and Combustion Processes. A number of factors influence how much polycyclic aromatic material will be generated from a given pyrolysis or combustion process. These include the pyrolysis or combustion method used, method efficiency, temperature range (or maximum), temperature duration, and material combusted or pyrolyzed. The number of processes used for industrial and other technical purposes is enormous, and the temperature at which these processes operate can vary significantly. Operating temperatures for industrial processes can be roughly categorized as low (several hundred degrees Celsius), medium (up to 800 or 900 degrees Celsius), and high (greater that 800 or 900 degrees Celsius). PACs are generated from processes operating in all three of these temperature ranges, however, the higher temperature processes tend to generate compounds that are higher in aromatic content. Incomplete or inefficient combustion processes also tend to generate higher quantities of PACs.

Both the temperature and the duration of the pyrolysis or combustion process will affect what types of polycyclic aromatic compounds will be generated. Typically only the most structurally stable PACs (those that are angular in structure such as phenanthrene and chrysene, and to a certain extent, those that have clustered structures such as pyrene) will be generated in appreciable quantities from high temperature or long duration combustion processes. PACs that are the least stable structurally (those that are linear in structure such as anthracene and tetracene, and those that are highly alkylated) may be generated initially from high temperature or long duration combustion processes, but if formed, will most likely equilibrate to more stable structures during these processes unless they are isolated or released immediately after being formed (as fugitive emissions, for example). PACs of low structural stability are generated in more appreciable quantities from low temperature or short duration combustion processes.

Non-technical Sources of PACs. Non-technical sources of PACs are those that are not controlled by technological means and consist primarily of forest, brush, and grass fires.

Technical Sources of PACs. Technical sources of PACs include those from industry as well as from other technological activities. Technical sources of PACs can be roughly divided into several categories including fuel combustion, industrial processes, and miscellaneous sources.

Listed below are several categories of technical sources that generate PACs and several specific sources within each category. The lists include the main sources that are known to generate PACs or are suspected of generating PACs. The lists are by no means exhaustive. Future data may disclose additional sources from either current or new technologies.

Section 2.3 Formation of PACs from the Combustion of Fuels

Fuel combustion is a major source of the energy used in the United States for transportation and heat and power generation and is a significant source of PAC emissions. Sources of PAC emissions from the combustion of fuels for transportation purposes include the following:

- gasoline powered engines (e.g. automobiles)
- diesel engines (e.g. trucks, buses, and construction equipment)
- two-cycle engines (e.g. outboard motors, and motorcycles, lawn mowers)

Key factors affecting the quantity of PAC emissions generated from the above sources include the efficiency of the engine involved, the operating temperature of the engine, and the fuel or fuel mixture used. Research begun in the late 1960s and continues today to develop more efficient engines and fuel mixtures that generate less emissions. Another source of PAC emissions that is associated with some forms of transportation but is not part of the actual fuel combustion process is the generation of particulate emissions from rubber tire wear.

Sources of PAC emissions from the combustion of fuels for heat and power generation include the use of following materials as fuels:

- coal
- oil
- gas
- wood

As in the combustion of fuels for transportation purposes, key factors affecting the quantity of PAC emissions generated from the combustion of fuels for heat and power generation include the efficiency of the combustion unit and the operating temperature of the unit. Unit type and combustion temperature can vary significantly depending on which material is used as the fuel. For each material that is used, unit type and temperature will also vary significantly depending on whether the heat or power generated is for industrial, municipal, or residential purposes.

Section 2.4 Formation of PACs from Major Industrial Processes

Several industrial processes are know to or are suspected of generating significant quantities of PACs. Industrial sources of PACs include processes involved in the manufacture of the following materials:

- synthetic fuels from coal processing operations
- synthetic fuels from petroleum refining
- synthetic fuels from feedstocks other than coal and petroleum
- products other than fuels from coal and petroleum feedstocks

The intent of most coal processing and petroleum refining operations is the conversion of crude fossil fuels into synthetic fuels of higher commercial value. In addition to coal and petroleum, several other natural substances as well as a few synthetic materials are used minimally in the manufacture of synthetic fuels (or are currently being investigated for this purpose). Subsequent processing of by-products obtained from the manufacture of synthetic fuels (particularly those manufactured from coal and petroleum) results in a variety of non-fuel products.

PACs may be generated as emissions (usually particulate) from industrial processes or may be contained in the intended commercial product or by-products. Process type and temperature are key factors affecting the quantity of PACs generated. In addition, PACs may be present in significant quantities in the crude feedstocks (particularly crude petroleum feedstocks) used in these industrial processes.

Manufacture of Synthetic Fuels from Coal Processing Operations. Although the majority of the coal mined in the United States is used directly as a fuel, a significant quantity is processed into refined solid, liquid, and gaseous fuels. Mined coal and coal dust are natural sources of PACs, however, PACs are known to be generated from several coal processing operations and are suspected of being generated from others. Because of the potentially significant variations in the many factors involved in coal processing operations (such as source of coal, process design, unit efficiency, and process conditions including temperature and pressure), most processing operations should be considered possible sources of PACs unless data clearly shows otherwise.

More than 100 specific coal processing operations have been developed. These processes can be roughly categorized into four major areas: thermal decomposition, hydrogenation, gasification, and extraction. Of the major coal processing operations developed, the thermal decomposition method (including carbonization or pyrolysis) is the process that is most likely to generate significant quantities of PACs. Carbonization is used in the manufacture of coke, a fuel and reductant used in blast furnaces in the iron and steel industry. By-products from carbonization are typically gaseous in form and can be a significant source of fugitive PAC emissions. Condensation and rigorous scrubbing of these gaseous by-products results in the recovery of several mixtures of materials that include coal tars, light oils, ammonia liquor, and gases. The light oils generated from the carbonization process typically contain monocyclic

aromatics and crude naphthalene and may contain small amounts of low molecular weight polycyclic aromatic compounds. The majority of the PACs generated from coal carbonization are contained in the coal tar product. Other major components in coal tars include phenolics and paraffins.

The carbonization process generally involves destructive distillation of coal in a coke oven operating at high temperatures (900-1400°C). The mechanism of coal decomposition is a complex process that is believed to occur via several stages. The initial stage of decomposition occurs at temperatures between 450 and 500°C. It is in this temperature range that the radical species that eventually combine to form PACs are generated. As heating continues, a partially polymerized tar is formed. This intermediate material formed during the manufacture of coke is a complex mixture of hundreds of hydrocarbon species including PACs with 3 to 8 or more condensed aromatic rings and an average molecular weight of approximately 300. During the last stage of coal carbonization, the highly polymerized aromatic components that constitute coke are formed (the molecular weights of these components are typically greater than 3000).

Medium temperature (700-900°C) and low temperature (up to 700°C) carbonization processes, currently not nearly as common in the United States as the high temperature process, yield different ratios of solid, liquid, and gaseous products. The high temperature process typically produces the highest yield of coke and the lowest yield of coal tar. The relative ratio of the components that constitute the coal tars produced by each process will also vary with temperature. The low temperature process typically produces a tar (low temperature tar) that is highest in paraffin and phenolic content whereas the high temperature process typically yields a tar (high temperature or coke tar) that is highest in aromatic content.

PACs may be formed from coal gasification, however, in most first and second generation gasification processes, the oils and tar by-products typical to coal carbonization processes are formed in insignificant quantities or are not formed at all. One exception in coal gasification processes is the Lurgi method in which oil and tar by-products are generated in addition to the intended gasification product, synthesis gas (a mixture of primarily carbon monoxide and hydrogen). As in coal carbonization, PACs generated from the Lurgi method may be contained in the oils but are most likely to be found in the crude tars. Analysis of the components in Lurgi gasification oils and tars shows that these materials are very similar to low temperature carbonization oils and tars. The quantity of polycyclic aromatic material found in Lurgi gasification by-products, particularly the tar by-product, therefore should be less than the quantity found in products and by-products obtained from higher temperature processes.

PACs also may be formed from coal hydrogenation (liquification) processes, however, this coal processing method is currently of minimal commercial use in the United States. The products obtained from coal hydrogenation include gases, coal oil, and residues. The intended product is an oil suitable for use as a commercial fuel. The coal oil obtained from the process boils over a large temperature range (175-550°C).

Distillation of coal oil into light, medium, and heavy fractions results in material that can be upgraded to oils suitable for commercial use as fuels. If PACs are formed from coal hydrogenation, they most likely will be found in the medium and heavy distillation fractions of the coal oil product and in the residues obtained from the hydrogenation. In comparison to the three carbonization processes, coal hydrogenation is roughly analogous to the low temperature carbonization with respect to process operating temperature. The maximum temperature reached during both processes is relatively low, and the quantity of PACs subsequently formed therefore should be less than the quantity formed from higher temperature processes.

Manufacture of Synthetic Fuels from Petroleum Refining. Crude petroleum contains a range of components that include gases (natural gas is occasionally included in this group), liquids (including oils and tars), and solids (asphalt and bitumen are often included in this group). The components found in crude oil are enormous in number and type. Major types of compounds contained in crude oil include paraffins, aromatic compounds, and, to a lesser extent, sulfur and nitrogen-containing compounds. Almost every known type of aromatic compound has been found in petroleum including PACs with two to seven or more condensed aromatic rings. It has been estimated that one-sixth of the components found in the crude oil distillation fraction boiling from 370 to 535°C are PACs.

In addition to being contained in crude petroleum, PACs are known to be generated from several petroleum refining processes and are suspected of being generated from others. The major refining processes are described below. Because of the potentially significant variations in the many factors involved in petroleum refining processes (such as source of crude petroleum, refinery design, unit efficiency, and process conditions including temperature and pressure), most processes should be considered possible sources of PACs unless data clearly shows otherwise.

The principle products obtained from petroleum refining are transportation fuels and heating oils. The petroleum refining processes used to generate these products are enormous in number and type but can be roughly categorized into three general areas. Primary distillation separates crude petroleum into numerous fractions including light, medium, and heavy oils and residues. Conversion processes (usually cracking) convert components in the distillates into compounds of different molecular weight and boiling point. Upgrading processes (typically hydrotreating) further refine distillates into commercial products. PACs contained in crude petroleum may be found in the medium to heavy oils obtained from primary distillation, but are most likely to be found in the residues. The residual fraction is usually vacuum distilled to remove additional oil fractions. Vacuum bottoms may be used as fuel or asphalt or may be converted to coke by thermal cracking. Medium and heavy oil fractions typically undergo hydrocracking, steam cracking, or catalytic cracking. Petroleum tars, common by-products from petroleum cracking, are similar to coal tars and can contain significant quantities of PACs. After hydrotreating, final products from these cracking processes include gasoline, diesel and jet fuel, and heating oil.

Hydrocracking processes convert high molecular weight compounds to lower boiling materials. Hydrocracking also results in a decrease in the molecular weight of aromatic compounds (catalytic and steam cracking do not). Process conditions are similar to hydrotreating but are generally more extreme (higher temperatures and pressures are used). Products obtained from hydrocracking processes include diesel and jet fuels and kerosene. In catalytic cracking processes, heavy distillates are converted to lower molecular weight compounds that have boiling points in the range of gasoline and middle distillates. Process operating temperatures are in the 480-510°C range. Catalytic cracking produces approximately half of the gasoline consumed in the United States. Steam cracking is a thermal process used to generate olefinic compounds used in the manufacture of petrochemicals. Process operating temperatures are typically 800-850°C.

During catalytic processes (including hydrocracking), the catalyst used becomes deactivated by deposition of carbon on its active sites. The catalyst is regenerated by combustion of the deposits at temperatures in the 500-700°C range. During this regeneration process, PACs are likely to be formed in significant quantities.

Hydrotreating improves the quality of commercial products primarily by removing sulfur, but also by removing nitrogen, oxygen, and metals. Hydrotreating residues or crude petroleum will generate lower boiling materials of higher commercial value. Catalytic hydrotreating typically results in higher selectivity and faster reaction rates than thermal hydrotreating. If the feedstock used is crude petroleum or residual material, the catalytic process is often not possible, especially if metal content is high, because of irreversible deactivation of the catalyst. Typical operating temperatures for hydrotreating processes are in the 350-500°C range.

Although the general processes described above are the sources in the petroleum industry that are most likely to generate significant quantities of PACs, other practices in the industry may also generate PACs and should not be excluded. Flaring waste gas from petroleum refineries, for example, is a possible source of PAC emissions.

Manufacture of Synthetic Fuels from Feedstocks Other Than Coal and Petroleum. The major industrial processes used in the United States in the manufacture of synthetic fuels (described above) use coal and crude petroleum as feedstocks and include petroleum cracking for the production of fuels for transportation and heat and power generation, and coal carbonization for the production of coke for the iron and steel industry. Minor industrial processes for converting materials other than coal and petroleum to synthetic fuel products have also been developed or are currently under investigation and include pyrolysis of the following materials:

- biomass
- oil shale
- tar sands
- wood and other cellulose-based materials

- scrap material
- wastes

Although the products obtained from pyrolysis of these materials are used primarily as fuels, other uses may also be possible. The processes used in the pyrolysis of these materials *for* fuels are in general more controlled than the direct combustion of these and similar materials *as* fuels. The quantity of PACs formed from these processes is, as in the coal and petroleum processes described, dependent on the specific pyrolysis method used and the operating temperature of the method.

The pyrolysis of biomass, oil shale, and tar sands results in the formation of solid, liquid, and gaseous products, however, these materials currently are not utilized in the commercial manufacture of fuels in the United States. A variety of processing methods operating in a broad temperature range (450-900°C) are used in the pyrolysis of biomass, oil shale, and tar sands and include thermal decomposition or coking and, to a lesser extent, hydrogenation, gasification, and extraction. PACs may be generated from the pyrolysis of these materials as emissions or may be contained in the heavier liquid and solid products.

The controlled pyrolysis of wood, and to a lesser extent, bagasse, typically yields a solid char or charcoal and can be a source of PAC emissions. Process operating temperatures typically reach 500°C. Wood tar is a possible by-product from both the combustion of wood as a fuel and the pyrolysis of wood in the manufacture of charcoal. Components in wood tar may include PACs.

Products obtained from the pyrolysis of various scrap and waste materials can be solid, liquid, or gaseous in form and may be acceptable for direct use as fuels or may be upgraded to more suitable material. Scrap materials used include plastics and rubber. Waste materials are usually from municipal sources (wood, paper, and some plastics) or from agricultural sources (crop residues such as bagasse, rice straw and hulls, grain stalks, corn cobs, and grasses). PACs may be generated from the pyrolysis of these materials as emissions or may be contained in the heavier liquid and solid products.

Manufacture of Products Other Than Fuels from Coal and Petroleum Feedstocks. By-products generated from coal processing and petroleum refining are often used in crude form as a fuel at the site in which they are produced. The gaseous by-products from the carbonization of coal, for example, were at one time used as a general gaseous fuel until the advent of natural gas. Currently, the bulk of coke oven gas produced during carbonization is returned back to the coke oven as a fuel source or is used for other industrial heating purposes within the same plant.

By-products from the coal and petroleum industries more often are processed into materials suitable for various commercial uses other than as fuels. Certain oil fractions obtained from petroleum refining, for example, are further processed into their individual components or into simple mixtures for use as solvents or chemical feedstocks. Petrochemicals are important commercial products and include various low molecular weight aliphatic and aromatic

compounds. Light oils obtained from coal carbonization are similarly processed but contribute minimally to the chemical feedstock market compared to the processing of petroleum oils for the same purpose (other materials currently under investigation as sources of chemical feedstocks include biomass, oil shale, and tar sands). As mentioned previously, the by-products obtained from coal processing and petroleum refining that most likely contain PACs are the medium to heavy oils, crude tars, and residues.

Coal tars (particularly those obtained from low temperature carbonization) and petroleum tars are suitable for direct use only as a crude fuel. Utilization of crude tars for this purpose is typically not practiced in the United States. A more common practice is to distill tars to separate various liquid fractions from residues or pitch. Tar liquids can be further fractionated into components that include monocyclic aromatics such as benzene, toluene, and xylene; hydroxyl-substituted monocyclic aromatics such as phenols, cresols, and xylols; naphthalene; and pyridine. Pitches can be further processed for use in asphalt roofing and road applications (described below) or as binders for electrodes (particularly those used in aluminum smelting). Tars and pitches are also used in wood preservatives and in the manufacture of carbon black (described below), tar-epoxy coatings (used primarily in marine applications such as on ships or off-shore structures), and hydrocarbon resins (used in rubber, adhesives, inks, paints, coatings, and flooring).

Carbon black is used primarily in rubber reinforcement and to a lesser extent as a colorant for inks, paints, plastics, and paper. Carbon black is generated from the partial combustion or thermal decomposition of hydrocarbons in the gas phase. Process operating temperatures are typically high (1200-1600°C). Viscous oil and tar by-products obtained from petroleum refining and coal coking are commonly used as feedstocks in the manufacture of carbon black. These feedstocks are typically high in aromatic content and include decant oil (from petroleum cracking in gasoline production), residual petroleum tars (from steam pyrolysis of petroleum in ethylene manufacture), and coal tars (from coal carbonization). In addition to being likely components in several of the feedstocks commonly used in the manufacture of carbon black, PACs may also be generated from the partial combustion and thermal decomposition processes.

Although specific definitions exist for asphalt and bitumen, the definitions can vary, and the terms are often used interchangeably. Asphalt is generally defined as any material whose predominant constituent is bitumen. Bitumen is generally defined as a dark solid, semi-solid, or viscous material, natural or synthetic, that is composed primarily of high molecular weight hydrocarbons and includes tars and pitches. More specific definitions describe asphalt as only naturally-occurring material (such as rock and lake asphalt; mineral content is high) and bitumen as a product from crude oil (mineral content is low and hydrocarbon content is high). For the purpose of this document, the general definitions of asphalt and bitumen apply.

As mentioned previously, PACs are possible components in the thermally degraded materials (including coal and petroleum tars and pitches) that are commonly used in asphalt roofing and road applications. PACs are also generated from several processes involved in these applications. PACs have been identified from the air-blowing of asphalt, a procedure used to yield material with a higher softening point that is more suitable for roofing applications. Other procedures used in the asphalt industry that may generate PACs include, for example, asphalt hot-road mixing.

Section 3. CAS Number List of Individual Chemicals within the Polycyclic Aromatic Compounds Category

EPA is providing the following list of CAS numbers and chemical names to aid the regulated community in determining whether they need to report for the polycyclic aromatic compounds category. If a facility is manufacturing, processing, or otherwise using a chemical which is listed below, they must report this chemical.

Listing by CAS Number of Each Individual Chemical within the Polycyclic Aromatic Compounds Category	
Chemical Name	CAS Number
Benz[a]anthracene	56-55-3
Benzo[a]phenanthrene	218-01-9
Benzo[a]pyrene	50-32-8
Benzo[b]fluoranthene	205-99-2
Benzo[j]flouroanthene	205-82-3
Benzo[k]fluoranthene	207-08-9
Benzo[rst]pentaphene	189-55-9
Dibenz[a,h]acridine	226-36-8
Dibenz[a,j]acridine	224-42-0
Dibenzo[a,h]anthracene	53-70-3
Dibenzo[a,e]fluoranthene	5385-75-1
Dibenzo[a,e]pyrene	192-65-4
Dibenzo[a,h]pyrene	189-64-0
Dibenzo[a,l]pyrene	191-30-0
7H-Dibenzo[c,g]carbazole	194-59-2
7,12-Dimethyl-benz[a]anthracene	57-97-6
Indeno[1,2,3-cd]pyrene	193-39-5
5-Methylchrysene	3697-24-3
1-Nitropyrene	5522-43-0

Section 4. CAS Number List of Some Mixtures That Might Contain Chemicals within the Polycyclic Aromatic Compounds Category

EPA is providing the following list of CAS numbers and chemical names for mixtures which might contain polycyclic aromatic compounds within the category. This list will aid the regulated community in determining whether they need to report for the polycyclic aromatic compounds category. If a facility is manufacturing, processing, or otherwise using a mixture which is listed below and contains a polycyclic aromatic compound from the previous list of individual chemicals, they must report the polycyclic aromatic component. However, this list is not exhaustive. If a facility is manufacturing, processing, or otherwise using a mixture that contains a polycyclic aromatic compound from the previous list, they must report the polycyclic aromatic component, even if the mixture does not appear on the following list. Threshold calculations for the polycyclic aromatic compounds category should account only for the percentage of the polycyclic aromatic component(s) contained in the mixture.

CAS definitions are available for most of the mixtures in the following table. These definitions are provided in an appendix with the CAS numbers and chemical names of the mixtures.

Listing by CAS Number of Some Mixtures That Might Contain Polycyclic Aromatic Compounds within the Category[1]	
Mixture Name	CAS Number
Aromatic hydrocarbons, polycyclic	130498-29-2
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polystyrene pyrolysis-derived	101794-76-7
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene pyrolysis-derived	101794-75-6
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene-polypropylene pyrolysis-derived	101794-74-5
Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polystyrene pyrolysis-derived	101794-73-4
Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polyethylene pyrolysis-derived	101794-72-3
Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polyethylene-polypropylene pyrolysis-derived	101794-71-2
Aromatic hydrocarbons, polycyclic, from decompn. of solvent extd. coal tar pitch-2,4,6-trinitrophenol-reaction products	94113-85-6
Aromatic hydrocarbons, polycyclic, from decompn. of iodine-solvent extd. coal-tar pitch charge-transfer complexes	94113-84-5
Aromatic hydrocarbons, polycyclic, toluene dealkylation distn. residues	93762-97-1
Aromatic hydrocarbons, polycyclic, cyclohexanone-ext. residues	68409-74-5
Aromatic hydrocarbons, polycyclic, alkylnaphthalene-toluene thermal hydrodealkylation distn. residues	68333-90-4
Petroleum	8002-05-9

[1] It cannot be determined form the mixture name if a chemical from the category is actually contained in the mixture.

Listing by CAS Number of Some Mixtures That Might Contain Polycyclic Aromatic Compounds within the Category[1]	
Mixture Name	CAS Number
Anthracene oil	90640-80-5
Coke (coal tar), low-temp., low-temp. gasification pitch, calcined	150339-33-6
Tar bases, coal, low-temp., crude	141785-66-2
Tar bases, coal liquefaction, heavy oil fraction	140203-34-5
Extracts (coal), coal tar pitch solvent	130576-63-5
Extracts (coal), coal tar pitch solvent, reaction products with 2,4,6-trinitrophenol	94113-98-1
Extracts (coal), coal tar pitch solvent, reaction products with iodine	94113-97-0
Extract residues (coal), liquefaction heavy acid, alk. ext.	94113-96-9
Extract residues (coal), naphthalene oil acid, alk. ext.	94113-95-8
Distillates (coal tar), low-temp., pitch	140413-63-4
Distillates (coal tar), upper, fluorene-low	140203-27-6
Distillates (coal tar), high-temp., heavy oils	140203-21-0
Distillates (coal tar), gasification, pitch, full range	140203-20-9
Distillates (coal tar), gasification, heavy oils, pyrene fraction	140203-19-6
Distillates (coal tar), pitch, pyrene fraction	91995-52-7
Distillates (coal tar), pitch, heavy oils	91995-51-6
Distillates (coal tar), pitch, pyrene fraction	91995-42-5
Distillates (coal), liquefaction, heavy	91995-25-4
Distillates (coal tar), heavy oils	90640-86-1
Distillates (coal tar), upper, fluorene-rich	84989-11-7
Distillates (coal tar), upper, fluorene-free	84989-10-6
Pitch, coal tar, high-temp., heat-treated	121575-60-8
Pitch, mixed brown-coal tar-ethylene manufg. pyrolysis oil distn.	100403-59-6
Pitch, brown-coal tar	100403-58-5
Pitch, coal tar, high-temp., secondary	94114-13-3
Pitch, coal gasification tar, low-temp.	94114-12-2
Residues, alkene-alkyne manuf. pyrolysis oil byproduct distn.	93686-02-3
Residues, olefin manuf. pyrolysis oil distn.	92062-01-6
Residues (coal tar), pitch distn.	92061-94-4

[1] It cannot be determined from the mixture name if a chemical from the category is actually contained in the mixture.

Listing by CAS Number of Some Mixtures That Might Contain Polycyclic Aromatic Compounds within the Category[1]	
Mixture Name	CAS Number
Residues (coal tar), anthracene oil distn.	92061-92-2
Residues (coal), coke-oven gas-polycyclic arom. hydrocarbons reaction products distn.	92061-88-6
Aromatic hydrocarbons, polycyclic, automobile scrap shredder waste pyrolysis products	94581-00-7
Aromatic hydrocarbons, polycyclic, scrap cable pyrolysis	90989-45-0
Polyamides, polyester-, wastes, pyrolyzed, pyrolysis oil	100801-78-3
Polyamides, polyester-, wastes, pyrolyzed, pitch residue fraction	100801-77-2
Polyamides, polyester-, wastes, pyrolyzed, heavy oil fraction	100801-75-0
Hydrocarbon oils, arom., mixed with polyethylene, pyrolyzed, middle oil fraction	101227-14-9
Hydrocarbon oils, arom., mixed with polystyrene, pyrolyzed, middle oil fraction	101227-13-8
Hydrocarbon oils, arom., mixed with polyethylene and polypropylene, pyrolyzed, middle oil fraction	100801-64-7

[1]It cannot be determined from the mixture name if a chemical from the category is actually contained in the mixture.

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Appendix

101794-76-7 Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polystyrene pyrolysis-derived

Definition: A complex combination of hydrocarbons obtained from mixed coal tar pitch-polystyrene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 100°C to 220°C (2l2°F to 428°F) according to DIN 52025.

101794-75-6 Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene pyrolysis-derived

Definition: A complex combination of hydrocarbons obtained from mixed coal tar pitch-polyethylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 100°C to 220°C (212°F to 428°F) according to DIN 52025.

101794-74-5 Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene-polypropylene pyrolysis-derived

Definition: A complex combination hydrocarbons obtained from mixed coal tar pitch-polyethylene-polypropylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 100°C to 220°C (212°F to 428°F) according to DIN 52025.

101794-73-4 Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polystyrene pyrolysis-derived

Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polystyrene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 284°F) according to DIN 52025.

101794-72-3 Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polyethylene pyrolysis-derived

Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polyethylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 284°F) according to DIN 52025.

101794-71-2 Aromatic hydrocarbons, C20-28, polycyclic, mixed arom. oil-polyethylene-polypropylene pyrolysis-derived

Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polyethylene-propylene pyrolysis. Composed primarily of polycyclic aromatic

hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 184°F) according to DIN 52025.

94113-85-6 Aromatic hydrocarbons, polycyclic, from decompn. of solvent extd. coal tar pitch-2,4,6-trinitrophenol-reaction products

Definition: A complex combination of organic compounds obtained by addition of a picric acid solution to the solvent extract of a bituminous coal tar pitch and decomposition of the precipitated pitch-picric acid reaction product with bases. Composed primarily of high molecular weight polycyclic aromatic compounds.

94113-84-5 Aromatic hydrocarbons, polycyclic, from decompn. of iodine-solvent extd. coal-tar pitch charge-transfer complexes

Definition: A complex combination of organic compounds obtained by addition of iodine solution to the solvent extract of a bituminous coal tar pitch and decomposition of the precipitated pitch iodine reaction products. Composed primarily of high molecular weight polycyclic aromatic compounds.

93762-97-1 Aromatic hydrocarbons, polycyclic, toluene dealkylation distn. residues

Definition: A complex combination of hydrocarbons obtained from the distillation of products from the thermal hydrodealkylation of toluene. It consists predominantly of bi- and polynuclear aromatic hydrocarbons such as diphenyl, methyldiphenyl, fluorene, and phenanthrene.

68409-74-5 Aromatic hydrocarbons, polycyclic, cyclohexanone-ext. residues

Definition: A complex residuum from the cyclohexanone extraction of anthracene salts. It consists predominantly of polynuclear aromatic hydrocarbons such as anthracene.

68333-90-4 Aromatic hydrocarbons, polycyclic, alkylnaphthalene-toluene thermal hydrodealkylation distn. residues

Definition: The complex residuum from the distillation of products from the thermal hydrodealkylation of alkylnaphthalene and toluene. It consists predominantly of bi- and polynuclear aromatic hydrocarbons such as naphthalenes, biphenyl, fluorene and phenanthrene.

8002-05-9 Petroleum

Definition: A complex combination of hydrocarbons. It consists predominantly of aliphatic, alcyclic and aromatic hydrocarbons. It may also contain small amounts of nitrogen, oxygen and sulfur compounds. This category encompasses light, medium, and heavy petroleums, as well as the oils extracted from tar sands. Hydrocarbonaceous materials requiring major chemical changes for their recovery or conversion to petroleum refinery feedstocks such as crude shale oils, upgraded shale oils and liquid coal fuels are not included in this definition.

90640-80-5 Anthracene oil

Definition: A complex combination of polycyclic aromatic hydrocarbons obtained from coal tar having an approximate distillation range of 300°C to 400°C (572°F to 752°F). Composed primarily of phenanthrene, anthracene and carbazole.

141785-66-2 Tar bases, coal, low-temp., crude

Definition: The reaction product obtained by neutralizing the acidic extract of alkali-washed low-temperature coal tar middle oil with an alkaline solution, such as aqueous sodium hydroxide, to obtain the free bases. Composed primarily of a complex mixture of aromatic nitrogen bases.

140203-34-5 Tar bases, coal liquefaction, heavy oil fraction

Definition: The heavy oil obtained by the high pressure hydrogenation of bituminous coal is subjected to acid extraction and then neutralized. The crude bases thus obtained contain polynuclear nitrogen aromatics such as quinoline, acridine, and phenanthridine.

130576-63-5 Extracts (coal), coal tar pitch solvent

Definition: Solvent extract of bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.

94113-98-1 Extracts (coal), coal tar pitch solvent, reaction products with 2,4,6-trinitrophenol

Definition: Insoluble reaction product obtained by addition of a picric acid solution to the solvent extract of a bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.

94113-97-0 Extracts (coal), coal tar pitch solvent, reaction products with iodine

Definition: Extract obtained by adding an iodine solution to the solvent extract of a bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.

94113-96-9 Extract residues (coal), liquefaction heavy acid, alk. ext.

Definition: The neutral oil obtained by debasing and dephenolating the heavy oil from the high pressure hydrogenation of bituminous coal. Composed primarily of unsubstituted and alkyl-substituted aromatic polynuclear hydrocarbons that are partially hydrogenated and may contain heteroatoms.

94113-95-8 Extract residues (coal), naphthalene oil acid, alk. ext.

Definition: The neutral oil obtained by debasing and dephenolating the middle oil from the low temperature carbonization of bituminous coal. Composed primarily of a mixture of mono- and polynuclear, substituted and unsubstituted aromatic and naphthenic hydrocarbons and heterocycles as well as paraffinic hydrocarbons.

140413-63-4 Distillates (coal tar), low-temp., pitch

Definition: The distillate obtained during the heat treatment of low temperature coal tar pitch having an approximate distillation range of 100°C to 400°C (212°F to 752°F). Composed primarily of a complex mixture of aromatic compounds.

140203-27-6 Distillates (coal tar), upper, fluorene-low

Definition: A complex combination of hydrocarbons obtained by the crystallization of the fractional distillates from tar oil. It consists of aromatic polycyclic hydrocarbons, primarily diphenyl, dibenzofuran and acenaphthene.

140203-21-0 Distillates (coal tar), high-temp., heavy oils

Definition: The distillate from the fractional distillation of high-temperature coal tar having an approximate distillation range of 280°C to 450°C (536°F to 842°F). Composed primarily of tri- and polynuclear aromatic hydrocarbons and heterocyclic compounds.

140203-20-9 Distillates (coal tar), gasification, pitch, full range

Definition: The distillate obtained during the heat treatment of pitch obtained from coal gasification tar having an approximate distillation range of 100°C to 400°C (212°F to 752°F). Composed primarily of aromatic and other hydrocarbons, phenolic compounds and aromatic nitrogen compounds.

140203-19-6 Distillates (coal tar), gasification, heavy oils, pyrene fraction

Definition: The distillate from the fractional distillation of coal gasification tar having an approximate boiling range of 350°C to 450°C (662°F to 842°F). Composed primarily of phenanthrene and anthracene homologs, tetranuclear aromatic hydrocarbons which may also contain heteroatoms, high-boiling aliphatic and naphthenic hydrocarbons, and polynuclear phenols.

91995-52-7 Distillates (coal tar), pitch, pyrene fraction

Definition: The redistillate obtained from the fractional distillation of pitch distillate and boiling in the range of approximately 380°C to 410°C (716°F to 770°F). Composed primarily of tri- and polynuclear aromatic hydrocarbons and heterocyclic compounds.

91995-51-6 Distillates (coal tar), pitch, heavy oils

Definition: The distillate from the distillation of the pitch obtained from bituminous high temperature tar. Composed primarily of tri- and polynuclear aromatic hydrocarbons and boiling in the range of approximately 300°C to 470°C (572°F to 878°F). The product may also contain heteroatoms.

91995-42-5 Distillates (coal tar), heavy oils, pyrene fraction

Definition: The redistillate obtained from the fractional distillation of pitch distillate boiling in the range of approximately 350°C to 400°C (662°F to 752°F). Consists predominantly of tri- and polynuclear aromatics and heterocyclic hydrocarbons.

91995-25-4 Distillates (coal), liquefaction, heavy

Definition: The heavy oil obtained by distillation in the range of approximately 300°C to 550°C (572°F to 1022°F) of coal oil from the catalytic hydrogenation of coal and coal-derived products. Composed primarily of polynuclear aromatics and naphthenes. The product contains sulfur, oxygen and nitrogen compounds.

90640-86-1 Distillates (coal tar), heavy oils

Definition: The distillate from the fractional distillation of coal tar having an approximate distillation range of 300°C to 400°C (572°F to 752°F). Composed primarily of tri- and polynuclear aromatic hydrocarbons and heterocyclic compounds.

84989-11-7 Distillates (coal tar), upper, fluorene-rich

Definition: A complex combination of hydrocarbons obtained by the crystallization of the fractional distillates from coal tar. It consists of aromatic and polycyclic hydrocarbons, primarily fluorene and acenaphthene.

84989-10-6 Distillates (coal tar), upper, fluorene-free

Definition: A complex combination of hydrocarbons obtained by the crystallization of tar oil. It consists of aromatic polycyclic hydrocarbons, primarily diphenyl, dibenzofuran and acenaphthene.

121575-60-8 Pitch, coal tar, high-ternp., heat-treated

Definition: The heat treated residue from the distillation of high temperature coal tar. A black solid with an approximate softening point from 80°C to 180°C (176°F to 356°F). Composed primarily of a complex mixture of three or more membered condensed ring aromatic hydrocarbons.

100403-59-6 Pitch, mixed brown-coal tar-ethylene manufg. pyrolysis oil distn.

Definition: The residue from the joint distillation of brown coal tar and pyrolysis residual oil from ethylene plants. Composed primarily of polynuclear aromatic and naphthenic hydrocarbons which can be alkyl- and vinyl-substituted and can contain heteroatoms, paraffin hydrocarbons and high-boiling mono- and dinuclear phenols. It is a black solid with a softening point of 60°C (140°F) according to DIN 52025.

100403-58-5 Pitch, brown-coal tar

Definition: The residue from the distillation of brown coal tar formed by carbonization up to 1250°C (2282°F). Composed primarily of polynuclear aromatic and naphthenic

hydrocarbons and heterocycles, paraffin hydrocarbons and high-boiling mono- and dinuclear phenols. It is a black solid with a softening point of 50°C to 120°C (122°F to 248°F) according to DIN 52025.

94114-13-3 Pitch, coal tar, high-temp., secondary

Definition: The residue obtained during the distillation of high boiling fractions from bituminous coal high temperature tar and/or pitch coke oil, with a softening point of 140° to 170°C (284°F to 338°F) according to DIN 52025. Composed primarily of tri- and polynuclear aromatic compounds which also contain heteroatoms.

94114-12-2 Pitch, coal gasification tar, low-temp.

Definition: The residue from the distillation of bituminus coal pressure gasification tar. A black solid with a softening point of greater than 60°C (140°F) according to DIN 52025 and composed primarily of a complex mixture of polynuclear aromatic and naphthenic hydrocarbons that may be alkyl substituted and may contain heteroatoms, high boiling aliphatic hydrocarbons and polynuclear phenols.

93686-02-3 Residues, alkene-alkyne manuf pyrolysis oil byproduct distn.

Definition: A complex combination of hydrocarbons obtained as a residue from the distillation of residual oils that are obtained by the pyrolytic recovery of alkenes and alkynes from mineral oil products or natural gas. It consists predominantly of tri- and polynuclear aromatic and alkylaromatic hydrocarbons and has a softening point approximately 60°C to 180°C (140°F to 356°F) according to DIN 52025.

92062-01-6 Residues, olefin manuf.pyrolysis oil distn.

Definition: A complex combination of hydrocarbons obtained as a residue from the distillation of residual oils that are obtained by the pyrolytic recovery of alkenes and alkynes from petroleum products or natural gas. It consists predominantly of tri- and polynuclear aromatic and alkylaromatic hydrocarbons having a softening point of 20°C to 60°C (68°F to 140°F) according to DIN 52025.

92061-94-4 Residues (coal tar), pitch distn.

Definition: Residue from the fractional distillation of pitch distillate boiling in the range of approximately 400°C to 470°C (752°F to 878°F). Composed primarily of polynuclear aromatic hydrocarbons, and heterocyclic compounds.

92061-92-2 Residues (coal tar), anthracene oil distn.

Definition: The residue from the fraction distillation of crude anthracene boiling in the approximate range of 340°C to 400°C (644°F to 752°F). It consists predominantly of tri- and polynuclear aromatic and heterocyclic hydrocarbons.

92061-88-6 Residues (coal), coke-oven gas-polycyclic arom. hydrocarbons reaction products

distn.

Definition: The residue from the distillation of a complex reaction product, obtained by reaction of gases obtained by the dry distillation of bituminous coal with a distillate, consisting of di- and trinuclear aromatic hydrocarbons and their alkyl derivatives, with a softening point of 30°C to 50°C (86°F to 122°F). The residue consists predominantly of substituted aromatic di- and polynuclear hydrocarbons and sulfur-containing compounds.

94581-00-7 Aromatic hydrocarbons, polycyclic, automobile scrap shredder waste pyrolysis products

Definition: Pyrolysis product obtained from the thermal treatment of the organic portion of shredder waste arising from automobile scrap. Composed primarily of mono- to tetracyclic aromatic hydrocarbons and their alkyl derivatives.

90989-45-0 Aromatic hydrocarbons, polycyclic, scrap cable pyrolysis

Definition: Fraction formed by the thermal treatment of scrap cables at about 700°C (1292°F) with extensive exclusion of air. Consists chiefly of mono- to tetranuclear aromatic hydrocarbons and their alkyl derivatives.

100801-78-3 Polyamides, polyester-, wastes, pyrolyzed, pyrolysis oil

Definition: The oil obtained from the pyrolysis of textile wastes from a polyamide/polyester fiber mixture at 600°C to 800°C (1112°F to 1472°F). It consists predominantly of benzene and naphthalene and their homologs, benzonitrile and other di- and polynuclear aromatic hydrocarbons.

100801-77-2 Polyamides, polyester-, wastes, pyrolyzed, pitch residue fraction

Definition: A residue from the distillation of textile waste pyrolysis oil. It consists predominantly of polynuclear aromatic hydrocarbons boiling in a range above 350°C (662°F).

100801-75-0 Polyamides, polyester-, wastes, pyrolyzed, heavy oil fraction

Definition: A fraction from the distillation of textile waste pyrolysis oil. It consists predominantly of benzonitrile, naphthalene and homologs and other di- and polynuclear aromatic hydrocarbons boiling in the range of 200°C and 350°C (392°F to 662°F).

101227-14-9 Hydrocarbon oils, arom., mixed with polyethylene, pyrolyzed, middle oil fraction

Definition: The oil obtained from the heat treatment of polyethylene with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).

101227-13-8 Hydrocarbon oils, arom., mixed with polystyrene, pyrolyzed, middle oil fraction

Definition: The oil obtained from the heat treatment of polystyrene with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).

100801-64-7 Hydrocarbon oils, arom., mixed with polyethylene and polypropylene, pyrolyzed, middle oil fraction

Definition: The oil obtained from the heat treatment of a polyethylene/polypropylene mixture with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).